

A

Attachment A

**ACCUMULATION
OF
NEWS ANNOUNCEMENTS
ON
IRIDIUM SYSTEM
(JUNE 26 - JULY 2, 1990)**

Burson•Marsteller

Worldwide

MOTOROLA

IRIDIUM ANNOUNCEMENT

MEDIA PLACEMENT REPORT

COVERAGE: JUNE 26—JULY 2, 1990

MOTOROLA IRIDIUM MEDIA PLACEMENT REPORT
6/26-7/2 PRINT

PLACEMENT/TITLE	CIRCULATION	PAGE
-----------------	-------------	------

6/26 PRINT

THE NEW YORK TIMES	C: 1,149,683	A1 1
"SCIENCE FICTION NEARS REALITY: POCKET PHONES FOR GLOBAL CALLS"		

THE WALL STREET JOURNAL	C: 1,935,866	B1
"MOTOROLA SETS SATELLITE PHONE LINK"		

DAILY NEWS (NEW YORK, NY)	C: 1,180,139	MJ3
"CELLULAR GOES ORBITAL"		

THE WASHINGTON POST	C: 824,282	C1
"MOTOROLA PLANS GLOBAL CELLULAR PHONE SYSTEM"		

CHICAGO TRIBUNE	C: 740,713	A1
"MOTOROLA PHONE NET TO DIAL 77 SATELLITES"		

CHICAGO SUN-TIMES	C: 532,678	45
"MOTOROLA SATELLITE NET TO FILL IN CELLULAR GAPS"		

LOS ANGELES TIMES	C: 1,210,077	D1
"MOTOROLA PLANS GLOBAL CELLULAR TELEPHONE SYSTEM"		

THE TIMES (LONDON)	C: 431,069	
"LOW-ORBIT SATELLITES KEY TO GLOBAL PORTABLE PHONES"		

UNITED PRESS INTERNATIONAL	C: N/A	N/A 2
----------------------------	--------	-------

ASSOCIATED PRESS	C: N/A	N/A 3
"MOTOROLA ANNOUNCES PLANS FOR WORLDWIDE CELLULAR PHONE SYSTEM"		

REUTERS	C: N/A	N/A 4
"MOTOROLA PLANS SATELLITE PORTABLE PHONE NETWORK"		

REUTERS	C: N/A	N/A
"MOTOROLA EXPECTS CONSORTIUM TO FUND NETWORK"		

REUTERS	C: N/A	N/A
"MOTOROLA TO GAIN FROM NEW SATELLITE SYSTEM"		

DOW JONES	C: N/A	N/A
"MOTOROLA UNVEILS ITS WORLDWIDE COMMUNICATION SYSTEM"		

<u>PLACEMENT/TITLE</u>	<u>CIRCULATION</u>	<u>PAGE</u>
6/27 PRINT		
NEW YORK NEWSDAY	C: 711,264	43
BALTIMORE SUN "GLOBE-CIRCLING CELLULAR PHONES PREVIEWED"	C: 233,539	D1
USA TODAY "MOTOROLA NETWORK"	C: 1,210,077	B1
INVESTORS DAILY "MOTOROLA DETAILS PLANS FOR NEW GLOBAL CELLULAR SYSTEM"	C: 103,000	7
BOSTON GLOBE "MOTOROLA PLANS SATELLITE NETWORK"	C: 522,981	46
FINANCIAL TIMES "MOTOROLA TAKES THE LOW ROAD"	C: 285,879	
ATLANTA CONSTITUTION "MOTOROLA UNVEILS GLOBAL PHONE PLAN"	C: 310,434	
ATLANTA JOURNAL "MOTOROLA UNVEILS GLOBAL PHONE PLAN"	C: 194,938	
7/9 PRINT		
TIME "ALWAYS ON CALL"	C: 4,600,000	51
NEWSWEEK "PUSH-BUTTON AGE"	C: 3,149,253	56

- 1 -- THE NEW YORK TIMES NEWS SERVICE SERVICES 330 SUBSCRIBERS.
- 2 -- UNITED PRESS INTERNATIONAL SERVICES 750 SUBSCRIBERS.
- 3 -- ASSOCIATED PRESS COVERAGE INCLUDED ART WORK OF IRIDIUM SYSTEM. ASSOCIATED PRESS SERVICES 1,400 NEWSPAPERS AND 6,400 BROADCAST STATIONS.
- 4 -- REUTERS SERVICES APPROXIMATELY 6,300 SUBSCRIBERS IN THE NATIONAL MEDIA AND THE BUSINESS AND FINANCIAL COMMUNITY.

The New York Times

June 26, 1990
C: 1,149,683

COVER STORY

Science Fiction Nears Reality: Pocket Phone for Global Calls

By KEITH BRADSHAW

The small and portable telephone that can be used anywhere on earth has been a staple of science fiction and a Holy Grail of telephone engineers for several decades. Today Motorola Inc. will become the first company in the world to announce plans to build and operate such a phone system.

Company officials say Motorola intends to charge less than \$3,500 for a 25-ounce handset that would fit in an

overcoat pocket and could allow the user to make and receive calls from the North Pole to Antarctica. Current portable phones can be used only where radio antennas on towers and office buildings are close enough to relay the signal. They are of no use in many rural areas of the United States or outside major cities in the rest of the world.

Motorola's system, which it hopes to be operating in six years, calls for the company to supplement conventional radio antennas with a constellation of 77 satellites that would relay the calls, which would cost an estimated \$1 to \$3 a minute, said Durrell W. Hillis, general manager of the company's satellite communications division.

Potential users of the handsets are expected to include vacationers, business people and engineers traveling in places where phone service is not available or where an international call can take hours to complete. Other users would include passengers aboard ships and planes, and disaster relief crews working in places where all other communications had been dis-

rupted. On planes, the Motorola system would compete with a system offered by the GTE Corporation, but would have the advantage of being able to receive calls.

All of the technologies for the system have already been developed and need only to be adapted for use aboard satellites, Mr. Hillis said. But the plan faces significant financial and regulatory obstacles. Motorola estimates that putting the system in service will cost \$2.3 billion over six years and is seeking partners to help in the project. But space experts caution that the economics of a project like Motorola's are harder to forecast than the technical issues.

Other companies have found that the initial investment and the operating costs of satellite systems tend to exceed expectations, said Kenneth A. Hornon, the former vice president of planning for Satellite Business Sys-

tems, a failed effort by the International Business Machines Corporation to offer satellite-based telephone communications between fixed sites.

And while Motorola has an advantage in developing a satellite system for portable telephones because it is the world's largest and most technologically advanced producer of such telephones and equipment, it could face competition. The American Telephone and Telegraph Company declined to discuss whether it had any plans to offer such service, but is said to have had some discussions along these lines with other companies.

But Motorola said it has filed patent applications in 55 countries to prevent other companies from developing similar systems. And it has agreed to work with three organizations that control over much of the earth's surface the broadcast frequencies needed for the system.

Motorola has determined that at least 77 low orbiting satellites will be needed to insure that one is within a line of sight anywhere on the planet.



Fred R. Conrad/The New York Times

Durrell W. Hillis holds a prototype of the 25-ounce handset that Motorola intends to sell for its new planet-wide portable phone system. Behind him is a one-eighth scale model of the 77 satellites Motorola intends to orbit to relay calls on the system.

and that a second comes over the horizon before the first disappears. The company plans in 1994 to begin launching inexpensive 700-pound satellites, up to 11 per rocket, that are built to last five years; it will own the satellites but will license the right to build handsets that use them.

Motorola has named the project Iridium, after the element iridium, which has 77 electrons orbiting the atomic nucleus.

Although calls could be made from one handset to another, Motorola expects that most users would place calls to conventional wire-line telephones or cellular phones served by ground radio towers.

Motorola says it will need at least 700,000 users to break even. After having consulted many international organizations about the proposed venture, company officials forecast that the system could attract as many as five million subscribers worldwide paying at least \$100 a month by the year 2000.

Partners Sought

While Motorola plans to build much of the system itself, including almost all of the electronics, it is looking for partners to help finance Iridium and to operate it. The company is negotiating with British Telecom in London and companies in Japan, Australia, and Hong Kong, Mr. Hillis said.

Besides the commercial challenges, Iridium will need the permission of many governments to receive calls from their soil.

"Whether it'll be delivered on time, I'm not sure," said Michael J. Zulfiani, the president of Telesat Mobile Inc., a Canadian satellite company that has agreed to work with Motorola on the system. The technical issues represent "a challenge, but we're up to it," he said.

Mr. Zulfiani said that A.T.&T. had also approached Telesat Mobile to discuss a possible alliance to establish satellite-based mobile communications, but that the discussions had not been detailed and did not result in any agreement. Telesat Mobile controls the most readily usable microwave frequencies for such a system in Canada.

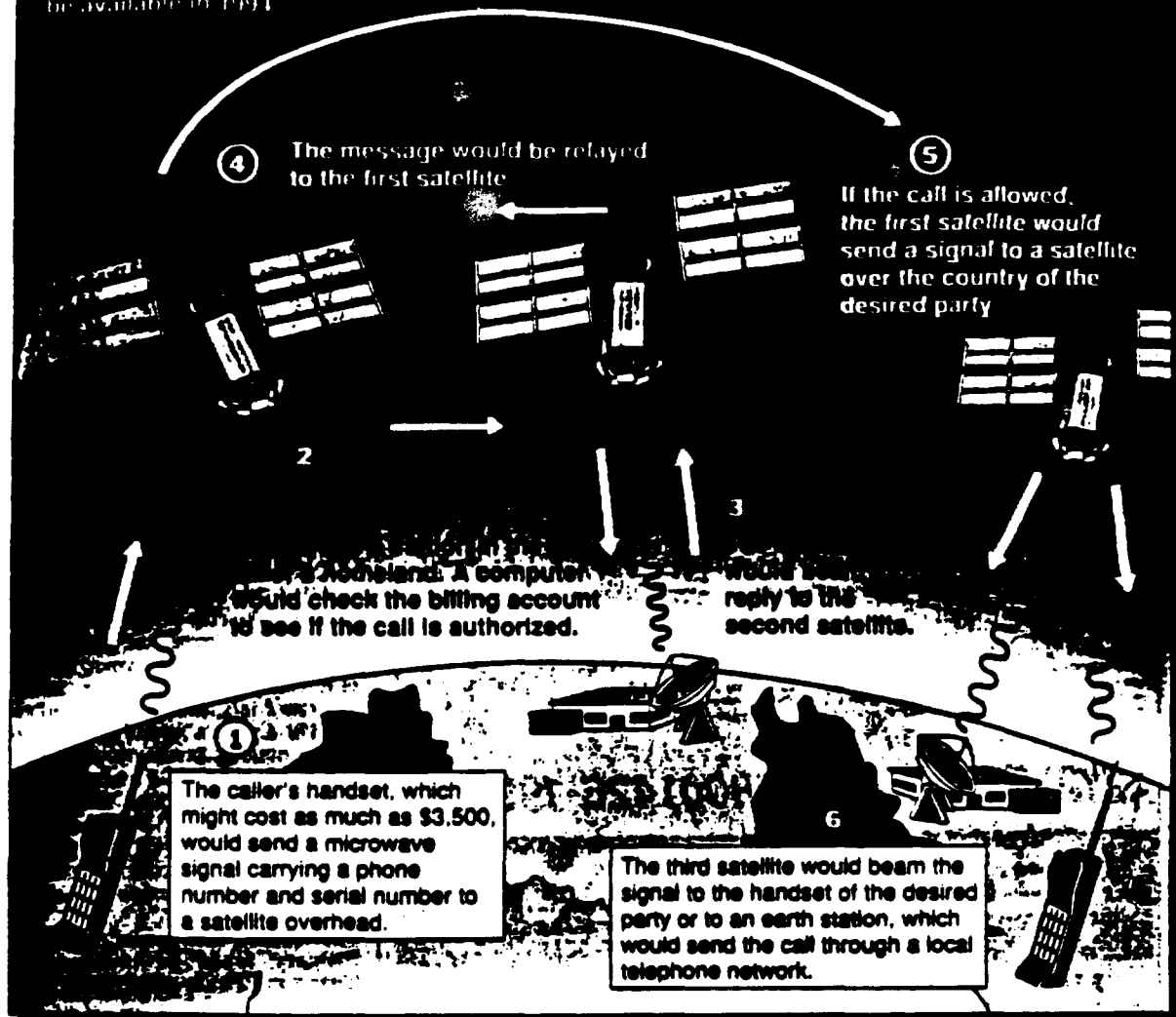
An Electronics Wizard

The technical problems involved in Iridium's construction may be the smallest of the obstacles facing Motorola, analysts said. Motorola is the nation's third-largest electronics company and the world's largest producer of cellular telephone equipment, and is known for its technological wizardry in developing mobile communications products.

The company envisions Iridium as a worldwide cellular telephone system that supplements conventional radio antennas. Cellular telephones acquired that name because the service areas are divided into cells a few miles across, each with a low-power radio transmitter. A motorist moving

Placing a Call by Satellite

Motorola proposes to launch 77 satellites that would circle the globe in low orbits and allow people to make or receive telephone calls anywhere on Earth. Motorola says partial service will be available in 1991.



The New York Times. Illustration by Arnold Bombay

from one area to the next is automatically transferred from one transmitter to the next, usually without interruption because computers tell the transmitter when to pass along a call to the next transmitter.

Each Iridium satellite will cover 37 cells on earth, said Bary R. Bertiger, the chief engineer and assistant general manager of Motorola's satellite communications division. Each cell will be 400 miles across and have a capacity of 336 simultaneous conversations if Motorola uses only those microwave frequencies already set aside for sea-to-shore and air-to-ground satellite communications; that number could be increased substantially if other frequencies are obtained. Because of the limited capacity, the handsets will also be compatible with terrestrial cellular service and are intended to send signals to satellites only in remote areas, he said.

The handsets will be 7½ inches long

and thicker than conventional handsets, with a 3¼ inch antenna. Sending a signal to a low-orbit satellite requires a tiny fraction of the power to send a signal to current communications satellites, which orbit 50 times higher above the earth's surface.

Motorola's strategic electronics division, which Mr. Hillis used to run, has produced communications equipment for virtually all NASA space programs. The company's equipment helped relay the first words from the Moon to the earth in 1969.

Motorola has not assembled a working handset because none of the necessary satellites have been launched, but the company says it has no doubt that it can mass produce the handsets, Mr. Bertiger said. It is common practice for Motorola and other communications companies not to miniaturize components for working handsets until the equipment to use them has been built.

Motorola has held discussions with

three companies that build satellites and with satellite launching companies like the Orbital Sciences Corporation in Fairfax, Va., he added, and has confidence in its cost estimates. Depending on the rockets chosen, the satellites will be launched individually or in groups of 11.

Regulatory decisions will be crucial in determining the number of subscribers that Iridium can reach. It will require certain frequencies and will need permission from a number of governments to receive — although not to send — calls from their soil, Mr. Hillis said.

Motorola has signed joint study agreements with three major institutions that control the necessary frequencies over much of the earth's surface: the International Maritime Satellite Organization, better known as Inmarsat; the American Mobile Satellite Corporation in Washington, which controls these frequencies over the United States; and Telesat Mobile in Ottawa.

THE WALL STREET JOURNAL

THE WALL STREET JOURNAL TUESDAY, JUNE 26, 1990

C: 1,935,866

TECHNOLOGY

Motorola Sets Satellite Phone Link

By ROBERT L. ROSE
And JOHN J. KELLER

Staff Reporters of THE WALL STREET JOURNAL

Motorola Inc. is gambling that the world needs a new cellular phone system that uses dozens of low-orbit satellites to connect people in remote spots to the rest of the planet.

The system, to be announced with fanfare today at the Hayden Planetarium in New York, would cost \$2.1 billion to fully put in space as early as 1996. "We think this is the way of the future," said John F. Mitchell, Motorola's vice chairman.

But the π -satellite system—which the company has dubbed "Iridium"—faces big obstacles. Among other things, the Schaumburg, Ill., electronics and semiconductor company needs partners, money, regulatory approval and customers to make it work.

The way Motorola sees it, a call from a portable cellular phone in the middle of nowhere—beyond the range of current cellular systems—would be routed through the "constellation" of small satellites. That would give the business person in the boondocks and the skipper at sea instant, clear contact with anyone else—and vice versa.

The Iridium system would use digital switching and transmission to handle both voices and data. But it wouldn't replace the current land-based cellular system. That means Motorola could continue to sell existing equipment even as it pushes expensive new equipment necessary to make calls on the new system.

A big risk is that consumers will get confused. Craig O. McCaw, chairman of McCaw Cellular Communications Inc., the nation's largest cellular phone service company, noted that cellular is growing and changing faster than anyone dreamed just a few years ago. "All of us have a lot of work to do to see how all these [different networks] are going to fit together."

Still, Mr. McCaw said his company is "excited" at the potential of the new system to provide universal phone coverage.

Others think Motorola's new system is closer to pie-in-the-sky than satellites-in-the-sky. "This may have some applications for [airline] flight communications services and in countries where there is limited service, but there's no way I can see this technology will be viable anywhere in the U.S.," said Herschel Shostack, president of Herschel Shostack Associates Ltd., a Silver Spring, Md., firm that specializes in cellular market analysis.

He noted that by 1992—before Iridium is expected to transmit its first call—more than 90% of the people in the U.S. and Canada will have access to regular cellular service. This will be augmented by the first high-capacity digital systems. And most of Western Europe will have similar coverage.

Motorola expects the mobile and portable terminals that it would make for the system to cost "as low as" \$3,000. Though Motorola expects the price to fall over time, Mr. Shostack notes that today's cellular phones are far cheaper at \$400 to \$500.

Motorola also must get other companies or countries to participate in a consortium to operate and pay for the \$2.1 billion space portion of the system. Motorola might put up as much as 20% of that total, but John Pemberton, a mobile communications analyst at Gartner Group in Stamford, Conn., says the cost is far higher than he expected.

In addition, operators of the new network face the daunting task of getting new licenses from the Federal Communications Commission and other international bodies to operate a satellite network in the new frequency.

And since current cellular systems operate at a different frequency, existing phones "would have to be programmed to operate with the new frequency," said Gregory J. Vogt, chief of the FCC's Mobile Services Bureau. "That could be a very expensive proposition" for customers, he said. Motorola brushed aside such concern, saying it would design its system to be compatible with all cellular phones.

Still, Motorola's plan isn't being taken lightly. "They're a well-established company" both in working with regulators and coming up with money, said Mr. Pemberton of the Gartner Group. He says there's

an 85% chance that the system will fly.

In contrast to larger communications satellites now in high orbit, the Motorola plan calls for small, low-orbit satellites that would allow easy radio links with portable cellular phones and clear sound with no delays or "echoes." It envisions 600,000 to 800,000 users in the first five years, and millions more after that.

The company says it's investing \$40 million to \$60 million to help prove the concept. But it sees itself mainly as a supplier to the system. Motorola's ambitious schedule calls for the launch of two demonstration satellites in 1992.

Motorola said the U.S. Delta and Atlas rockets and the European Ariane could launch multiple satellites, and the Pegasus air-launched vehicle could send up individual satellites.

The company said three organizations have agreed to study the potential of the satellite network: American Mobile Satellite Corp., which is licensed to provide mobile communications by satellite for the U.S. (and in which McCaw Cellular is a partner); and Telesat Mobile Inc., which has similar authorization for Canada; and the International Maritime Satellite Organization, a consortium that provides satellite communications for ships and aircraft. The maritime group's director general, Olof Lundberg, said it will study the system as a possible successor to its existing satellite network.

Motorola also said it has briefed the FCC on its plans and talked with potential partners. "The technical effort is going on full bore," said Mr. Mitchell. "By the end of this year, or early next year, we'll have a much clearer picture of who the players will be."

DAILY NEWS

Tuesday, June 26, 1990
C: 1,180,139

Cellular goes orbital

Motorola plans a \$2 billion global telephone network using 77 small satellites. The system is dubbed "Iridium" and due for full operations by 1998.

Washington Post

Tuesday, June 26, 1990
C: 824,282

Motorola Plans Global Cellular Phone System

Network Would Use 77 Low-Orbit Satellites

By John Burgeon
Washington Post Staff Writer

Motorola Inc. plans to develop a network of 77 small satellites that would bring cellular telephone service to any point on the globe.

According to executives familiar with the project, known as Iridium, the \$2.3 billion system would be financed and launched in the mid-'90s by an international consortium that Motorola hopes to organize. Announcement of the plan is expected to be made today in New York.

Subscribers would talk into small, hand-held units that would be linked

by radio waves to satellites circling 413 miles up—a relatively low altitude for communications satellites. Calls would be relayed from satellite to satellite and down to the ground to reach the other party, who would have to have compatible equipment.

At about \$3 per minute and \$3 per handset, the talk would be far costlier to compete with the conventional cellular systems in use in American cities today. But Motorola executives expect that the system, with truly global reach, could still find a ready market.

"The mass use will be in sparsely populated areas," says a Motorola spokesman. See CELLULAR, C3, Col. 1



Subscribers' phones would be linked by radio waves to satellites overhead.

Motorola Eyes Cellular System Based on Network of Satellites

CELLULAR, From C1

populated areas or in areas of the world such as underdeveloped countries that do not have good mobile telephone service today," said John Mitchell, vice chairman of the Schaumburg, Ill.-based electronics giant. Governments might use the system to keep in touch with remote villages, he suggested, or companies to communicate with oil rigs.

Three major satellite companies have signed agreements with Motorola for joint study of the concept: Inmarsat, the London-based international consortium that provides satellite links to ships at sea; American Mobile Satellite Consortium of Washington; and Telesat Mobile of Canada.

Industry analysts said major hurdles involving technology, regulation and money stand in the way of its satellite cellular system—an idea that

has been proposed by a number of other companies. Scott Chase, editor of trade publication *Via Satellite*, questioned whether the system made economic sense. Richard DalBello, head of the Commerce Department's office of space commerce, stressed that many competitors would fight for the scarce radio frequency the system would need.

"It's a very bold scheme, [but] very demanding," said Olof Lundberg, managing director of Inmarsat.

In view of Motorola's vast financial resources—its sales last year were almost \$10 billion—and expertise in cellular and space technology, however, the industry is paying close attention.

As described by Motorola, the satellites would weigh only about 700 pounds. They might be launched a half-dozen or more at once, maneuvering to separate orbits after their release in space. Two would go up in

1992 to "prove" the concept, with the full system aloft by the end of 1996.

Since the mid-1960s, large satellites in orbits so high that they seem to float above a single spot on the earth have been used widely to channel communications to and from large dishes at fixed locations on the Earth.

Adapting them to "mobile" callers in cars, airplanes or on foot, however, has proved difficult, in part because the ground units must be large and electrically powerful enough to send out signals that can reach satellites so far up.

Inmarsat has about 1,000 portable phones in use but they are bulky, suitcase-sized things with antennae that must be set up. Two U.S. companies have begun using satellites to let dispatchers keep in touch with long-distance trucks, trains and boats—but only by keyboard.

Chicago Tribune

35¢

Tuesday, June 26, 1990

C: 740,713

Motorola phone net to dial 77 satellites

By Marianne Taylor

By the end of the decade, Motorola Inc. envisions equipping a Chicago-based business executive with a cellular phone that works just as well when he steps off a plane in Melbourne, Australia, as it does when he makes a call on the way to his Arlington Heights home.

What stands in the way of this vision is about \$2 billion in investment, the launch of a flotilla of 77 low-orbiting satellites, and a vast array of complex technical considerations.

But if a system is developed as outlined by a Motorola executive Monday, it would place the Schaumburg-based manufacturer of sophisticated communications equipment firmly in the lucrative

realm of providing cellular phone service.

Durrell Hillis, Motorola vice president and general manager of satellite communications, said the company intends to form a consortium of four or five organizations, including Motorola, that will fund and develop the first global satellite-based cellular telephone system. The company has dubbed the venture "Iridium" (naming it after the chemical element that, past and present high school chemistry students will remember, has 77 electrons).

Speaking in advance of a Tuesday briefing, Hillis said three organizations have signed agreements with Motorola to study the venture, although none has com-

See Motorola, pg. 5

Global network for cellular phones

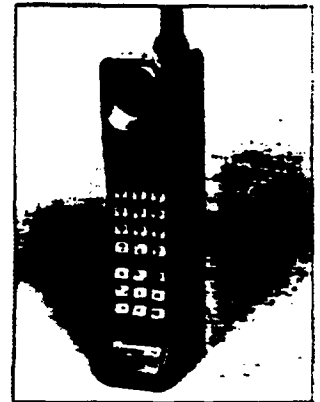
Motorola's Iridium satellite system will allow people with portable cellular radiophones to communicate anywhere on earth.



Satellite system

The \$2 billion plan includes a network of 77 small satellites ringing the planet in low-earth orbits.

Chicago Tribune Graphic; Source: Company reports



Placing a call

Portable cellular phones with small antennas will transmit signals directly to the closest satellite. After the caller is verified as a subscriber, the call is routed through a series of satellites to its destination.

Motorola

Continued from page 1
mitted funds.

These organizations have passed tough licensing tests that permit them to transmit voice and data signals by satellite in certain areas, including the U.S., so that Motorola won't have to seek separate licenses in those areas.

Hillis said Motorola hopes to have firm agreements with its partners in the venture, as well as funding commitments, by the end of the year. If Motorola signs with four other partners, its initial investment would be \$400 million, Hillis said.

Motorola plans to launch a network of 77 satellites that would orbit the earth at a relatively low altitude—about 414 miles—to provide mobile-phone service to parts of the U.S. and the world where current land-based mobile systems cannot, or have not yet been able to, reach. The firm plans to launch two demonstration satellites by 1992, all 77 by 1994, and have full service as early as 1996.

The satellite system not only would provide access to such hard-to-reach areas, but also would provide worldwide coverage via satellite for cellular customers, enabling a caller using a portable phone to communicate anywhere else, Hillis said.

In some areas of the world where traditional phone service is sorely limited by outdated or scarce equipment, Motorola hopes its new network will provide more basic telephone service.

"In some Eastern Bloc countries, for instance, there is a tremendous need for communications systems," Hillis said. With a satellite-based system, "the infrastructure would be overhead, in space," so that a government need only issue appropriate licensing for an auxiliary phone network, which would then open the way for a new market for telephones and the satellite service.

Motorola intends to retain an ownership interest in operating the system, as well as to build the telephones and eventually about half the replacement satellites, Hillis said.

The first batch of satellites will be built by a yet-to-be-named subcontractor, Hillis said, but Motorola hopes to build half the satellites thereafter at its plant near Phoenix.

The company already has announced an expansion of its mobile-phone manufacturing capacity, with plans to build a new facility in north suburban Libertyville.

Motorola expects the cellular telephone market to grow to 100 million customers worldwide by the end of the decade, Hillis said. The company hopes to snare a

Motorola nears accord with Hitachi on chips

By Marianne Taylor

Signaling that an end is near in a bitter patent-infringement dispute, Motorola Inc. and Hitachi Ltd. said Monday they have agreed on "a framework" for settling the fight, which has twice threatened to delay shipments of a key computer part to U.S. manufacturers.

Spokesmen for the companies said they will jointly ask for a longer stay of a court order that bars them from selling the disputed computer chips, including Motorola's powerful 68030 chip that forms the brains for computers made by Apple Computer Inc., Hewlett Packard Corp. and Sun Microsystems Inc.

Last week, a federal judge in Texas temporarily barred Motorola and Hitachi from selling the chips, although Motorola quickly appealed to a higher court and won a stay.

Before that stay expires at the end of this week, representatives of both companies plan

to ask for a longer stay to give them time to complete details of a pact on which they have reached basic agreement, a Hitachi spokesman said.

The spokesman said that will take two to three months, after which the companies expect to seek to drop the litigation, which has lasted for 18 months.

Motorola initiated the legal battle when it accused Hitachi of using some of its designs in microprocessors Hitachi produced. Hitachi then claimed Motorola infringed on one of its patents in developing its popular 68030 chip.

A Texas judge twice ordered the companies to stop selling their chips in the U.S. and to try to work out an agreement on the dispute. The orders, short-lived because stays were issued both times, hurt Motorola more than Hitachi because the Japanese company's chip hasn't been widely sold in the United States.

small portion, or 1 million, in that time for its satellite-based network, although the system will have a capacity for 10 million customers.

The first handsets for the system will cost about \$3,000, said Ray Leopold, Motorola's systems manager for the Iridium project. Although the fees per minute to use the system will be determined by whoever contracts with the Motorola consortium to provide the service in different areas, Motorola estimates that a call at first will cost \$3 a minute—about 10 times what it costs to make a call on existing mobile-phone systems, which use land-based

transmitters.

The three companies agreeing to cooperate in the early stages of the venture are American Mobile Satellite Corp., a Washington, D.C.-based space technology company that holds a Federal Communications Commission license to provide mobile satellite service to users in the U.S.; Telesat Mobile Inc. of Canada, which has similar agreements north of the border; and International Maritime Satellite Organization of London, an international consortium that has rights to transmit signals to ships at sea, as well as on land in several countries.

Chicago Sun-Times

TUESDAY, JUNE 26, 1990

C: 532,678

Motorola satellite net to fill in cellular gaps

By Lisa Holton

Motorola Inc. will detail today a \$2 billion global satellite telephone network that would allow someone to make a cellular phone call where no cellular service has gone before.

The Schaumburg company's new system, which has been trumpeted in the trade press the last few weeks, will be called Iridium and start operation by 1994.

It will consist of 77 small satellites that will do the same job as established cellular systems, which use ground-based antennas

to pick up phone signals from cellular callers and transmit them into the stationary telephone system.

Conventional cellular phone calls are transferred from tower to tower as the user moves from cell to cell.

Iridium will work only where there isn't a local cellular phone system with those ground antennas, such as Ameritech Mobile Communications or Cellular One. "It won't replace or compete with existing phone service," said a Motorola executive who asked not to be named Monday. "It will

Turn to Page 47

Motorola

Continued from Page 45

complement it and fill in the blanks where there's no ground antennas at all."

So the system is more likely to be used in a sparsely populated rural area or in international locations where cellular telecommunications don't exist. Motorola maintains that it would work best in Third World or Eastern European nations that want to upgrade communications systems without a ground-based transmitter network.

Motorola's expenditure will include launching the 77-satellite

"constellation," which will fly in low orbit. The system will handle voice and data.

The low altitude of Iridium's satellites, Motorola maintains, will allow easy radio links with portable cellular radiotelephones on Earth, using small antennas rather than satellite dishes to pick up the signals from above.

Motorola also has memorandums of understanding with the London-based International Maritime Satellite Organization, American Mobile Satellite Corp. of Washington and Telesat Mobile Inc. of Canada to explore the potential of the network.

Motorola expects Iridium to break even with 700,000 customers.

MARKETS/MONEY/PERSONAL FINANCE

BUSINESS

Los Angeles Times

Motorola Plans Global Cellular Telephone System

■ Telecommunications: The network is designed to serve areas in the Third World and Eastern Europe that have no state-of-the-art service.

By CARLA LAZZARECHI
Times Staff Writer

Taking global telecommunications a giant step forward, Motorola Inc. is expected to unveil plans today for a \$2-billion network of orbiting satellites to provide cellular telephone service to remote portions of the planet.

The new system, named Iridium, will rely on 77 small, low-orbiting satellites to send cellular radio signals from one caller's handset to another's, without the need for switching towers and relay stations as with current cellular telephone service in land-based or point-to-point or which tradi-

tional phone service is based.

The Motorola network, projected for full operation by 1993, is designed to serve areas now without state-of-the-art telephone service—the primary markets are Third World nations and Eastern Europe—and is expected to connect with traditional land-line service of all types already available in industrialized nations.

"The network is designed to fill in the gaps of the worldwide telecommunications system," said Duane Hillis, general manager of Motorola's satellite communications operations. "When you get to the end of the traditional service area, your call just gets handed up to the 'bird' orbiting the Earth." The system will be able to handle both voice and computer data.

The new network, which generated widespread interest long before its official unveiling this morning at the Hayden Planetarium in New York City, promises to deliver a service that experts have long predicted would become a reality before

the end of the century: instantaneous communication and access to data banks, friends, family and business from anywhere on the globe.

"This is the future," says Steve Baumgart, a telecommunications analyst with Dataquest, a Silicon Valley technology marketing research firm.

The experts call it "personal communication," and they predict that it will expand the worldwide cellular market from about 7 million subscribers currently to 100 million by the year 2000.

Eventually, they say, nearly everyone will carry some sort of personal telephone, either on the wrist, in pockets or purses, or in a computer, that will allow individuals to make and receive calls wherever they are. Such personal phones already exist. Last year Motorola, already the world's largest supplier of cellular telephones, introduced a pocket-sized model weighing just 10 ounces.

Schaumburg, Ill.-based Motorola has al-

so teamed with International Business Machines to start a radio network; contract specially equipped personnel can pinpoint. And McGraw Cellular Communications, the nation's largest cellular service, has launched an ambitious land-based cellular communications network that will give cellular customers in North America access to radio waves almost anywhere in the continent.

The satellite cellular network, analysts say, is just one more step down the same path.

In the new telecommunications work everyone would have a personalized telephone number, much like a Social Security number, that would travel with individuals wherever they went. Calls using the system would not need to know the location of the person being called as would not need to rely upon a geographical cellular telephone code. Calls were simply dial the phone number of the person

Phone no. 714-244-1111, 2

PHONE: Global Network

Continued from B1
they wished to reach.

Iridium or any similar system would transmit calls to telephones the same way as land-based cellular phones, equipped with small radio antennas mounted to pick up the frequency emitted by the satellite.

With traditional cellular service, land-based radio towers transmit calls in a limited area known as a cell, and transfer calls from tower to tower as users move—usually in their cars—from cell to cell.

Iridium—the name is based on the chemical element with 77 electrons orbiting around its nucleus—works on the same principle, except a cell would cover hundreds of square miles. As the user changes cells, the call is transferred from one satellite to another.

Motorola officials said the satellite system would be best suited to providing service in remote areas because each of the satellite service areas would be able to handle a maximum of about 10,000 telephone calls at once, a fraction of the number handled by traditional land-based cellular relay stations. For that reason, Motorola will market the system in countries with vast undeveloped stretches or relatively primitive telephone systems rather than in dense urban areas that are more communally

served by existing land-based cellular networks.

Because large high-flying satellites cannot transmit to anything as small as a signal from a hand-held radio transmitter, Motorola plans a network of low-orbit mini-satellites, each about three feet in diameter and orbiting Earth at a height of 435 nautical miles. With 77 satellites, each covering an area about 650 miles in diameter, every point on the earth's surface is in the continuous sight of one of the transmitters.

Hillis said Motorola hopes to form a consortium with at least four or five partners to develop, build the satellites and operate the network. He said the company had agreements with International Maritime Satellite Organization (Inmarsat) in London, American Mobile Satellite Corp. of Washington and Telesat Mobile Inc. of Canada to explore the potential of the network.

Inmarsat, based in London, is a cooperative of 50 member nations that provide communications for ships and aircraft.

Hillis said Motorola has also talked to industry leaders in Australia, Japan, Hong Kong and Taiwan about the possibility of participating in the venture.

THE TIMES TUESDAY JUNE 26 1990

Low-orbit satellites key to global portable phones

By NICK NUTTALL, TECHNOLOGY CORRESPONDENT

EXPLORERS in the depths of the Amazon jungle, day trippers at Land's End or friends fishing the Nile on a fishing boat will soon be able to send letters or talk to people anywhere in the world with a telephone that fits in a handbag or pocket.

The global, mass market, mobile phone is at hand with several, the international communications company of which British Telecom is a key shareholder, and Motorola, the American communications company, are planning to study the development of a "portable phone network in the sky".

Under the agreement, to be entered in London today, the two groups are to spend one year examining the cost, technical, engineering and regulatory issues which must be overcome to make the network a reality.

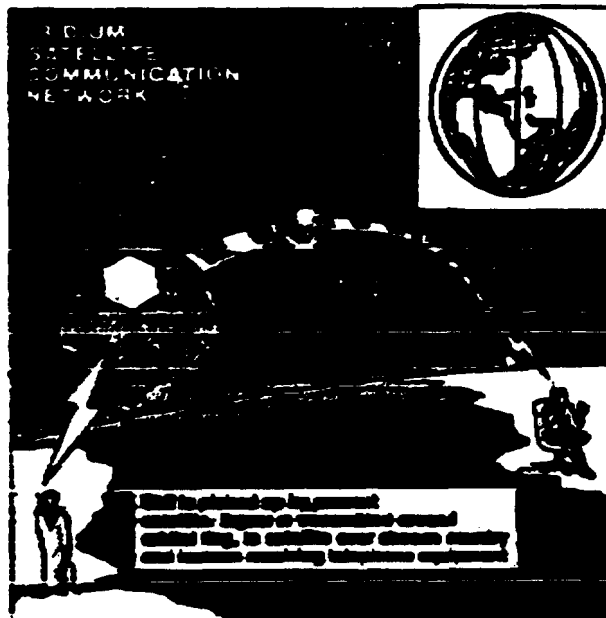
Neil Lundberg, director of the 39-nation organisation, and the scheme

"was a bold concept and the kind of development that may give us the global pocket communicator, usable anywhere on the planet".

Bary Bortiger, assistant general manager for satellite communications at Motorola in Chandler, Arizona, yesterday said the company had already spent two years "proving the basic principles". A preliminary launch and testing campaign was set for 1992 and full service was expected to begin in 1994.

The concept, which is endorsed by the industry after the discovery of a number of satellite-based systems being launched, is a move away from the trend towards ever bigger, high-flying satellites, with coverage or coverage provided by bands of low earth orbit satellites criss-crossing in the poles.

Very geostationary satellites, positioned high over the



polar regions and each capable of receiving and transmitting television and telephone signals to a third of the planet, are already in orbit but power

constraints make them unsuitable for a global pocket phone network.

The network is even made of 14 cross-orbit satellites,

spaced 2,000 nautical miles apart and capable of processing signals digitally, Motorola says. These will fly at a height of around 413 nautical miles (187 nautical miles below the destructive Van Allen belt which rings the earth, 600 miles above the surface).

Under the plan, someone dialling a telephone number in London from the Australian outback would find their call picked up by one satellite over the Pacific which would relay it to a following satellite.

The system would also be able to communicate with each other, switching the signal until it was over England, Mr Bortiger said. The cost of the release of the signal to a destination could be triggered by close in the network traffic.

Mr Bortiger said, however, that Motorola was also looking at the possibility of different systems on which portable telephone numbers unrelated to the geographic location of the structure could be used.

Burson-Marsteller

r f bc-motorola:220ped sked 6-27 0780
Motorola unveils plan for satellite network
By ISABELLE CLARY
UPI Business Writer

NEW YORK (UPI) _ Motorola Inc. announced plans Tuesday to launch a network of 77 satellites that will allow cellular telephone users to make international calls from anywhere on Earth.

The network, called Iridium, will consist of 77 small satellites orbiting at low altitude that will relay communications made by portable radiotelephones from anywhere _ even remote land locations or aboard ships or airplanes _ to any point around the globe.

"I hope you'll remember today as being a milestone in communications," said John Mitchell, Motorola's vice chairman. "This is the day that real space communications started for the world."

Motorola chose the Hayden Planetarium in Manhattan to present what the Schaumburg, Ill., company described as its "constellation of satellites" that will support full around-the-globe voice and data digital transmissions by 1996.

Motorola said two test satellites could be launched as early as 1992, while the 77 satellites, which are expected to have a lifespan of five years, will be launched between 1994 and 1996.

Portable phones today can be used only within range of the radio antennae that relay analog signals, thus leaving out many rural locations in the United States and virtually entire regions outside major cities in many foreign countries.

Because they will be positioned at a low orbit of 413 nautical miles, the satellites _ about a meter in diameter and weighing 700 pounds _ will offer a blanket coverage of the Earth. Call signals will be relayed through a series of digital switching points or computerized gateways to any existing telephone network.

The computerized network will be able to immediately identify a user regardless of the location of the user, who can simply dial the number allocated to his or her portable unit.

Today's analog-based portable cellular telephones will be replaced by new digital units equipped with their own antenna. Motorola plans to sell the 25-ounce handsets at around \$3,500, and a one-minute long-distance call could cost as much as \$3.

Because of the costs involved, satellite-assisted digital cellular phones are expected to essentially be employed by business users, mainly those who work in industries having to communicate from remote locations, such as oil, mining or timber, or in areas that have no access to alternate, cheaper means of communications.

The system will be particularly useful in disaster situations where all communications are cut off, such as in earthquake-stricken regions or at airplane crash sites.

Industry experts said Motorola is likely to spend around \$2 billion on the project and has been looking for partners to finance the venture.

The experts said Motorola, which competes against Ericsson of Sweden as the world's leader in cellular communications, could generate as much as \$1.3 billion in additional revenues in the first year Iridium becomes fully operational.

While the technology will allow it to turn the Earth into what Motorola described as "a global village," the company still has to negotiate globally business agreements with telecommunications authorities to make the project feasible.

Motorola said it has already signed preliminary agreements with the London-based International Maritime Satellite Organization, which provides communications for ships at sea, with American Mobile Satellite Corp. in Washington, D.C., and with Telesat Mobile Inc. of Canada.

Motorola clearly has taken an early lead on what could be a huge international market and could cut into conventional international long-distance carriers' business.

But John Pemberton, communications analyst with the Gartner Group in Stamford, Conn., said the competition, including American Telephone & Telegraph Co., was not likely to remain idle in the face of the Motorola challenge.

"We are talking about a potentially very large market," Pemberton said. "The competition is not going to remain far behind. I believe that AT&T is looking into an alliance with Geostar, which needs a partner to compete against Motorola."

Pemberton also did not rule out the possibility of a business alliance aimed at the European market and involving Ericsson.

Last year, Motorola generated one-third of its \$9.2 billion revenues from communications products.

upi 06-26-90 02:24 ped

Burson-Marsteller

AP

r f PM-MotorolaCellular Bjt 06-86 0628

^PM-Motorola Cellular, Bjt.07497

^Motorola Announces Plans for Worldwide Cellular Phone System

^LaserGraphic()

^By BART ZIEGLER=

^AP Business Writers=

NEW YORK (AP) - Motorola Inc. announced today plans to build a satellite-based phone system that would allow the use of portable telephones around the world.

The system, called Iridium, envisions a network of 77 satellites that would receive calls from hand-held telephones resembling today's cellular phones.

The new system would include rural areas or foreign points that are frequently out of range of conventional cellular services. Motorola expects full service to be available as soon as 1996.

The satellites would pass the calls around the globe to the intended recipients. If the recipients have an Iridium phone, they would receive the call directly; otherwise, the calls would connect with a conventional, land-based phone system to be completed. The system also could reach a user on a traditional land-based cellular system.

"What we have done is put together a concept that allows, for the first time, personal communications to occur anywhere in the world," said Durrell W. Hillis, a Motorola vice president who heads the effort.

Iridium would cost an estimated \$2 billion, which would be shared by Motorola and four or five partners, Hillis said. The partners have not been chosen.

Hillis said Motorola knows of no other similar system in the works.

John Pemberton, an analyst with the research firm Gartner Group of Stamford, Conn., said American Telephone & Telegraph Co. is believed to be working on plans for a satellite-based cellular phone system that would use two giant satellites fixed in position over the Earth. The Iridium satellites would orbit the planet.

Pemberton said he was impressed with Motorola's plans and called them achievable. However, he said he believed the system would need more than 77 satellites to provide sufficient capacity.

The Iridium system, under development since late 1987, could be used to supplement conventional land-based phones in nations where that service is poor or lacking capacity, such as in Eastern Europe, Hillis said.

Iridium - named after the 77th element on the periodic table - would not have the capacity to replace conventional cellular phone systems in urban areas, he said.

Motorola said it has signed agreements with three satellite operators to explore constructing the system: American Mobile Satellite Corp. of Washington, D.C., International Maritime Satellite Organization of London, and Telesat Mobile Inc. of Canada.

Hillis said these three groups may become partners and part owners of Iridium.

Motorola also said it is negotiating with other potential partners, including Great Britain's principal phone company, British Telecommunications PLC, and organizations in Australia, Hong Kong and Japan.

the satellite system, says a spokesman for the company. "We are not operating the satellites," Hillis says. "However, we are working with organizations that have significant experience in placing satellites in orbit and have such authority," he adds.

The satellites would operate like a cellular phone system, with the only "paging" call being made by the phone user. The satellites would be placed in orbit in a way similar to a ground-based cellular phone system.

The satellites would be located 412 nautical miles above the Earth, considerably a low orbit for satellites. The low orbit would ensure that each point on the Earth's surface would be in a continuous line of sight with a satellite, and allow the use of small hand-held phones rather than satellite dishes.

Each Iridium user would be given a personal telephone number. For someone to reach that user, he would simply dial the number. He would not have to know the user's location, Motorola said.

Iridium would be a boost for Motorola in several areas, the spokesman says. It would increase sales of the company's cellular phones. Not all cellular phones would not be compatible with the system, but Motorola also would construct the satellites. In addition, the company would share in revenues from subscriber fees.

Since Iridium phones would be incompatible with conventional cellular systems, a user most likely would need to carry both types of phones in order to always be in contact. Hillis said he envisions the development of phones that would be compatible with both systems.

Motorola, based in Schaumburg, Ill., already is the world's largest maker of cellular phones.

Motorola has extensive experience in satellite and outer-space communications. It made the communications equipment for every U.S. space mission, Hillis said.

AP-111 06-20 00 017EDL7

Burson-Marsteller
Reuter

MOTOROLA PLANS SATELLITE PORTABLE PHONE NETWORK

By Catherine Arnst

LONDON, June 25. Reuter - Motorola Inc (MOT.NY) announced plans on Tuesday for a two billion dollar satellite network for portable telephones that will allow subscribers to make and receive calls anywhere in the world.

Callers using the system will not need to know the location of the person being called, but would just dial the phone number to be connected, it said.

The network, which calls for 77 low-orbit satellites, would expand service far beyond the cellular networks now used, which mainly exclude rural areas, large bodies of water and airplanes.

MORE

Rtr 23:04 06-25-90

MOTOROLA PLANS =2 LONDON

It would also open up a much wider market for the Illinois based firm's own equipment. Motorola is currently the world's largest maker of mobile phones.

Motorola executives told Reuters in an interview that the network, named Iridium, would transmit calls to telephones the same size as hand-held cellular phones with small radio antennae, rather than the bulky suitcase-size phones usually associated with satellite transmission.

Cellular phones use radio towers to transmit calls in a limited area known as a cell. As the user moves from cell to cell, the call is transferred from radio tower to radio tower.

MORE

Rtr 23:05 06-25-90

MOTOROLA PLANS =3 LONDON

The Iridium system would work on the same principle, except a cell would cover a much wider area hundreds of miles in diameter. As the user changes cells, the call is transferred from one satellite to another.

Large, high altitude satellites cannot transmit to anything as small as a hand held radio transmitter, which is why Motorola is planning a network of small, low orbit satellites.

Motorola said it plans to start launching satellites in 1994 with full service starting by late 1996. Durrell Hillis, general manager of satellite communications at Motorola, said the firm estimates Iridium would need 700,000 users to break even.

MORE

Rtr 23:05 06-25-90

MOTOROLA PLANS #5 LONDON

"I don't see any impact on profits," Hillis said, in part because Motorola expects to supply much of the equipment for the system, offsetting capital expenses.

Motorola also does not plan to be the operator of the system. "We will be an equity partner in the operation but others would run it," Hillis said.

Motorola has signed memoranda of understanding with the London based International Maritime Satellite Organization (Inmarsat), American Mobile Satellite Corp., Based in Washington, and Telesat Mobile Inc. Of Canada to explore jointly the potential of the network.

MORE

Rtr 23:05 06-25-90

MOTOROLA PLANS #4 LONDON

"This system is designed to fill in the world's telecommunications gaps," Hillis said. It would not have the capacity to serve urban areas, so would not go head to head with cellular providers.

But Hillis said it would be ideal for Third World or Eastern European nations who want to upgrade their communications system quickly without spending a lot on ground-based transmitters.

Hillis said it will cost more than two billion dlrs to establish the network, but the company expects to share the cost with four to five partners.

MORE

Rtr 23:05 06-25-90

MOTOROLA PLANS #6 LONDON

Hillis said the company has also held discussions with British Telecommunications Plc (BTY.L) and numerous other service providers.

"We are going to sit down and look at the feasibility issues on a totally non-committal basis," Inmarsat director general Olof Lundberg told Reuters. Inmarsat is an international cooperative with 59 member nations which provides communications for ships and aircraft. Lundberg cautioned that the technical and regulatory obstacles to such a system are considerable but satellite technology "is approaching the point where it is realistic."

MORE

Rtr 23:05 06-25-90

MOTOROLA PLANS =7 LONDON

Lundberg said that such a system could eventually take over all satellite communications. in the next century.

"The costs of entry are very high. The financial, technical, political barriers are considerable, but the rewards are also considerable," he said.

At the heart Iridium would be 77 small satellites, about one metre in diameter, that would orbit the earth at a height of 413 nautical miles.

Such low-orbit satellites usually lose contact with their target when they move too far away.

MORE

Rtr 23:05 06-25-90

MOTOROLA PLANS =8 LONDON

But Motorola said the large number of satellites it plans would ensure that every point on the earth's surface would be in continuous sight of one of more of the satellites.

The satellites could be launched by a large variety of space vehicles, Hillis said, including the Pegasus rocket owned by Orbital Sciences Corp. <ORBI.O> of Virginia.

REUTER

Rtr 23:05 06-25-90

Burson-Marsteller

Reuter

MOTOROLA<MOT.N> EXPECTS CONSORTIUM TO FUND NETWORK

NEW YORK, June 26. Reuter - Motorola Inc said it expects a consortium of countries and companies to provide the bulk of the 2.1 billion dlrs needed to fund the space portion of its worldwide mobile telecommunications network.

Motorola said it is funding the project's initial development but that it plans to contribute only 200 mln dlrs of the estimated 2.3 billion dlr cost of the system.

"If members of the space consortium subscribe to this...we will play no role" said John Mitchell, Motorola's vice chairman, at the announcement of the planned network here.

MORE

Rtr 11:32 06-26-90

MOTOROLA<MOT.N> EXPECTS #2 NEW YORK

Motorola currently has agreements from three satellite organizations to explore the potential of such a network. It has no outside financial commitments yet, it said.

Motorola currently plans to manufacture the equipment but Mitchell said the company is prepared to take an equity stake in the project if necessary and put up 20 pct of the money needed to pay for the space portion of the network.

"We will put up as much as 20 pct if it makes sense," he said.

The planned network would allow cellular phone service in remote areas through the use of low-orbit satellites.

REUTER

Rtr 11:34 06-26-90